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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,651	05/01/2006	Hisashi Matsuda	290428US3PCT	3206

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ALEXANDRIA, VA 22314

EXAMINER

VERDIER, CHRISTOPHER M

ART UNIT	PAPER NUMBER
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3745

NOTIFICATION DATE	DELIVERY MODE
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06/24/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/577,651	Applicant(s) MATSUDA ET AL.	
	Examiner Christopher Verdier	Art Unit 3745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 April 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 16,17,19-29 and 31-40 is/are pending in the application.
- 4a) Of the above claim(s) 38 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16,17 and 19-28 is/are allowed.
- 6) ☒ Claim(s) 29,31-37,39 and 40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 April 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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Applicant's Amendment dated April 7, 2009 has been carefully considered but is non-persuasive. Claim 23 has been amended to overcome the rejection under 35 USC 112, second paragraph set forth in the previous Office action. Correction of this matter is noted with appreciation.

Applicant's argument that Kvasnak 6,419,446 does not disclose that the protruded portion forming the covered portion consists of a single concave curved surface is persuasive. Applicant's argument that the publication "Controlling Secondary-Flow Structure by Leading-Edge Airfoil Fillet and Inlet Swirl to Reduce Aerodynamic Loss and Surface Heat Transfer" does not disclose that the protruded portion forming the covered portion consists of a single concave curved surface is not persuasive. Figures 2, 4, 7b, and 7c, and most clearly figures 7b and 7c disclose this feature.

Election/Restrictions

Newly submitted claim 38 is directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

Newly submitted claim 38 recites that the blade bodies are connected to the wall surface at a tip side thereof, and the wall surface on the tip side is formed as an upward inclined surface and an upward inclined surface from the front edge portion of the blade bodies as viewed from the front side of the blade bodies. This species was not originally claimed.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution

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on the merits. Accordingly, claim 38 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 29, 31-35, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over the publication “Controlling Secondary-Flow Structure by Leading-Edge Airfoil Fillet and Inlet Swirl to Reduce Aerodynamic Loss and Surface Heat Transfer” (hereinafter referred to as “the publication”) in view of Kvasnak 6,419,446. The publication (figures 2, 4, 7b, and 7c; page 2,

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column 2; page 3, column 1, lines 1-7; page 4, column 1, the last paragraph; and page 5, column 1, the last sentence of the second paragraph) discloses a turbine blade cascade structure substantially as claimed, comprising: a plurality of blades having respective blade bodies and provided in series on a surface; a wall surface connecting the blade bodies so that connected portions of the wall surface and blade bodies form corner portions, respectively; and a cover portion (the fillet) disposed only at a portion near a front edge portion of each of the blade bodies corresponding to a flow of a working fluid in the corner portions, the cover formed to the connected portion, extending to an upstream side of the flow of the working fluid and formed as a protruded portion having a concave curved surface toward a height direction of the front edge portion of the blade body from a base portion on the upstream side of the flow of the working fluid. A tip side of the blade body is provided with the cover portion. The protruded portion having the concave curved surface is formed into a fan-like configuration that extends to a front side and a back side of the blade body with respect to a stagnation point in a steady operation of the working fluid that collides against the front edge portion of the blade body. The protruded portion is raised from the upstream side to the height direction of the front edge portion of the blade body. The blade bodies are supported by a wall surface at a tip side of the blade bodies. Concerning claim 34, which recites “which is formed by selecting one of a connecting piece that has been preliminarily made as an independent member, a machined piece together with the blade body, and a welded deposit”, this is a product-by-process limitation. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product-by-process claim does not depend on its method of production. If the product in the product-by-process claim is the same as or

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obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). The wall surface for connecting the blade bodies is flat. The protruded portion forming the cover portion is formed from a single concave curved surface.

However, the publication does not disclose that the plurality of blades are provided on the wall surface in a circumferential direction (claim 29), and does not disclose that an angle θ of a sector of the protruded portion having the fan-like configuration with respect to the stagnation point in the steady operation of the working fluid that meets against the front edge portion of the blade body is measured to be 20 degrees (claim 33).

Kvasnak shows a turbine blade cascade having a plurality of blades 28 provided on a wall surface in a circumferential direction 30, 32, with an angle θ of a sector of a cover 38 having a protruded portion having a fan-like configuration with respect to a stagnation point 56 in the steady operation of the working fluid that meets against a front edge portion of a blade body being 20 degrees, for the respective purposes of guiding working fluid in an annular flowpath to a turbine, and diverting high temperature core gas flow away from the portion where the leading edge of the airfoil abuts the wall surface, thus decreasing the pressure gradient and secondary core gas flow in the direction of walls 30, 32.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the turbine blade cascade of the publication such that the plurality

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of blades are provided on the wall surface in a circumferential direction, and such that an angle θ of a sector of the protruded portion having the fan-like configuration with respect to the stagnation point in the steady operation of the working fluid that meets against the front edge portion of the blade body is measured to be 20 degrees, as taught by Kvasnak, for the respective purposes of guiding working fluid in an annular flowpath to a turbine, and diverting high temperature core gas flow away from the portion where the leading edge of the airfoil abuts the wall surface, thus decreasing the pressure gradient and secondary core gas flow in the direction of the wall.

Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over the publication “Controlling Secondary-Flow Structure by Leading-Edge Airfoil Fillet and Inlet Swirl to Reduce Aerodynamic Loss and Surface Heat Transfer” (hereinafter referred to as “the publication”) and Kvasnak 6,419,446 as applied to claim 29 above, and further in view of Tiemann 2002/0182067. The modified publication shows all of the claimed subject matter except for the wall surface on the root side formed as a straight downward inclined surface from the front edge portion of the blade bodies toward the upstream side as viewed from the front side of the blade bodies.

Tiemann shows a turbine blade cascade having blade bodies 11a being connected to a wall surface at a root side near 52, with the wall surface on the root side formed as a straight downward inclined surface from the front edge portion of the blade bodies toward the upstream side as viewed from the front side of the blade bodies, with the wall surface for connecting the

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blade bodies being flat, for the purpose of supporting the turbine blade cascade and guiding working fluid to flow smoothly along the wall surface.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified turbine blade cascade of the publication “Controlling Secondary-Flow Structure by Leading-Edge Airfoil Fillet and Inlet Swirl to Reduce Aerodynamic Loss and Surface Heat Transfer” such that the wall surface on the root side is formed as a straight downward inclined surface from the front edge portion of the blade bodies toward the upstream side as viewed from the front side of the blade bodies, and such that the wall surface for connecting the blade bodies is flat, as taught by Tiemann, for the purpose of supporting the turbine blade cascade and guiding working fluid to flow smoothly along the wall surface.

Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over the publication “Controlling Secondary-Flow Structure by Leading-Edge Airfoil Fillet and Inlet Swirl to Reduce Aerodynamic Loss and Surface Heat Transfer” (hereinafter referred to as “the publication”) and Kvasnak 6,419,446 as applied to claim 29 above, and further in view of Pearce 3,959,966. The modified publication shows all of the claimed subject matter except for the wall surface on the root side formed as a downward inclined curved surface from an intermediate portion of the blade bodies toward the upstream side of the front edge portion as viewed from the front side of the blade bodies.

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Pearce shows a turbine blade cascade having blade bodies 13 connected to a wall surface 32 at a root side, with the wall surface on the root side formed as a downward inclined curved surface from an intermediate portion of the blade bodies toward the upstream side of the front edge portion (near 43) as viewed from the front side of the blade bodies, for the purpose of supporting the turbine blade cascade and guiding working fluid to flow smoothly along the wall surface.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified turbine blade cascade of the publication “Controlling Secondary-Flow Structure by Leading-Edge Airfoil Fillet and Inlet Swirl to Reduce Aerodynamic Loss and Surface Heat Transfer” such that the wall surface on the root side is formed as a downward inclined curved surface from an intermediate portion of the blade bodies toward the upstream side of the front edge portion as viewed from the front side of the blade bodies, as taught Pearce, for the purpose of supporting the turbine blade cascade and guiding working fluid to flow smoothly along the wall surface.

Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over the publication “Controlling Secondary-Flow Structure by Leading-Edge Airfoil Fillet and Inlet Swirl to Reduce Aerodynamic Loss and Surface Heat Transfer” (hereinafter referred to as “the publication”) and Kvasnak 6,419,446 as applied to claim 29 above, and further in view of Crossley 3,843,279. The modified publication shows all of the claimed subject matter except for the wall

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surface on the tip side formed as an upward inclined curved surface curved from an intermediate portion of the blade bodies toward the front edge portion of the upstream side.

Crossley shows a turbine blade cascade having blade bodies 14a connected to a wall surface 22 at a tip side, with the wall surface on the tip side formed as an upward inclined curved surface curved from an intermediate portion of the blade bodies toward the front edge portion of the upstream side, for the purpose of supporting the turbine blade cascade and guiding working fluid to flow smoothly along the wall surface.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified turbine blade cascade of the publication “Controlling Secondary-Flow Structure by Leading-Edge Airfoil Fillet and Inlet Swirl to Reduce Aerodynamic Loss and Surface Heat Transfer” such that the wall surface on the tip side is formed as an upward inclined curved surface curved from an intermediate portion of the blade bodies toward the front edge portion of the upstream side, as taught by Crossley, for the purpose of supporting the turbine blade cascade and guiding working fluid to flow smoothly along the wall surface.

Allowable Subject Matter

Claims 16-17 and 19-28 are allowed.

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Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Verdier whose telephone number is (571) 272-4824. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward K. Look can be reached on (571) 272-4820. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Christopher Verdier/
Primary Examiner, Art Unit 3745

Christopher Verdier
Primary Examiner
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